Dr. Zabinski Recognized for Solid Lubricant Film Research which Extends the Life of Aircraft and Space Vehicles

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Payoff

Molecular engineering of solid lubricant film research has great significance to the Air Force. These films can increase the performance and life span of aircraft and space vehicle components while reducing lubricant degradation during storage. Dr. Jeffrey S. Zabinski's efforts could save millions of dollars each year by ensuring flight safety and mission capability, and helping to lower repair and replacement costs.

Accomplishment

Dr. Zabinski, a materials scientist at the Materials and Manufacturing Directorate's (ML's) Nonstructural Materials Branch, was one of 12 individuals to receive the Arthur S. Flemming Award for extraordinary contributions to the federal government during 1998. Dr. Zabinski was recognized for design, development and evaluation of solid lubricant films that increase coated-components, life and performance, and reduce lubricant degradation.

Background

Wear on aircraft and missile surfaces hampers flight operations and results in repair and replacement costs running into billions of dollars each year. More than $30 million is spent annually repairing fasteners that seize because the lubricants can't withstand the temperatures. Dr. Zabinski spearheaded a program to determine the causes of fastener seizure and find a solution. He also conducted research to resolve friction and wear problems on moving mechanical assemblies in spacecraft. As ML's principal investigator in the field of tribology (the study of friction and wear), Dr. Zabinski conducted pioneering research leading to the molecular engineering of solid lubricant films, which represent a new approach for extending the life of system components and improving their performance. Solid lubricants and hard surface coatings can be used in high temperature oxidizing environments, the hard vacuum of space, liquid oxygen and liquid hydrogen environments, high humidity environments, and in microelectromechanical systems (MEMS). Prior to Dr. Zabinski's research and discovery, no one had developed the extensive knowledge base required to understand friction and wear mechanisms, the chemical/physical properties controlling these mechanisms, or how to purposely change these properties to improve solid lubricant performance. Dr. Zabinski is also a recipient of the Charles J. Cleary Scientific Achievement Award and the Air Force's Basic Research Award Honorable Mention. The Flemming Award, presented by George Washington University, honors Dr. Arthur S. Flemming, who served with distinction in the federal government and education for seven decades. Past recipients include: Senator Daniel Moynihan (1965); Elizabeth Dole (1971); and Dr. Anthony Fauci (1979) of the National Institute for Allergies and Infectious Diseases.